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May 22, 2019

VIA ECFS
Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington DC 20554

Re: Docket Nos. 14-166, 14-165 *Promoting Spectrum Access for Wireless Microphone Operation*, et al.

Docket No. 16-185, *International Bureau Seeks Comment on Recommendations Approved by World Radiocommunications Conference Advisory Committee*

Notice of *Ex Parte* Communications

Dear Ms. Dortch:

On behalf of Sennheiser Electronic Corporation, and pursuant to Section 1.1206(b)(2) of the Commission's Rules, I am electronically filing this notice of oral *ex parte* communications in the above-referenced dockets.

On May 20, 2019, Joe Ciaudelli, Director of U.S. Spectrum Affairs for Sennheiser Electronic Corporation; Axel Spies, Special Legal Consultant, Morgan Lewis, on behalf of Shure; and Henry Cohen, Senior RF Systems Design Engineer and Spectrum Manager, CP Communications; and I, met with the following Commissioner and Commission staff in four separate meetings:

-Commissioner O'Rielly and Erin McGrath;

-William Davenport of Commissioner Stark's Office;

-Evan Swarztrauber of Commissioner Carr's Office; and

-Michael Mullinix, Larry Olson, Robert Nelson, and Nese Guendelsberger of the International Bureau.

In each case we distributed and presented the information and positions in the attached slide deck and the attached draft World Radiocommunication Conference Proposal. In the meeting with International Bureau staff, we also discussed possible modifications to the attached Proposal.

Please do not hesitate to contact me with any questions.

Respectfully submitted,

Paul J. Feldman
Counsel for
Sennheiser Electronic Corporation

cc: Erin McGrath
William Davenport
Evan Swarztrauber
Michael Mullinix
Larry Olson
Robert Nelson
Nese Guendelsberger

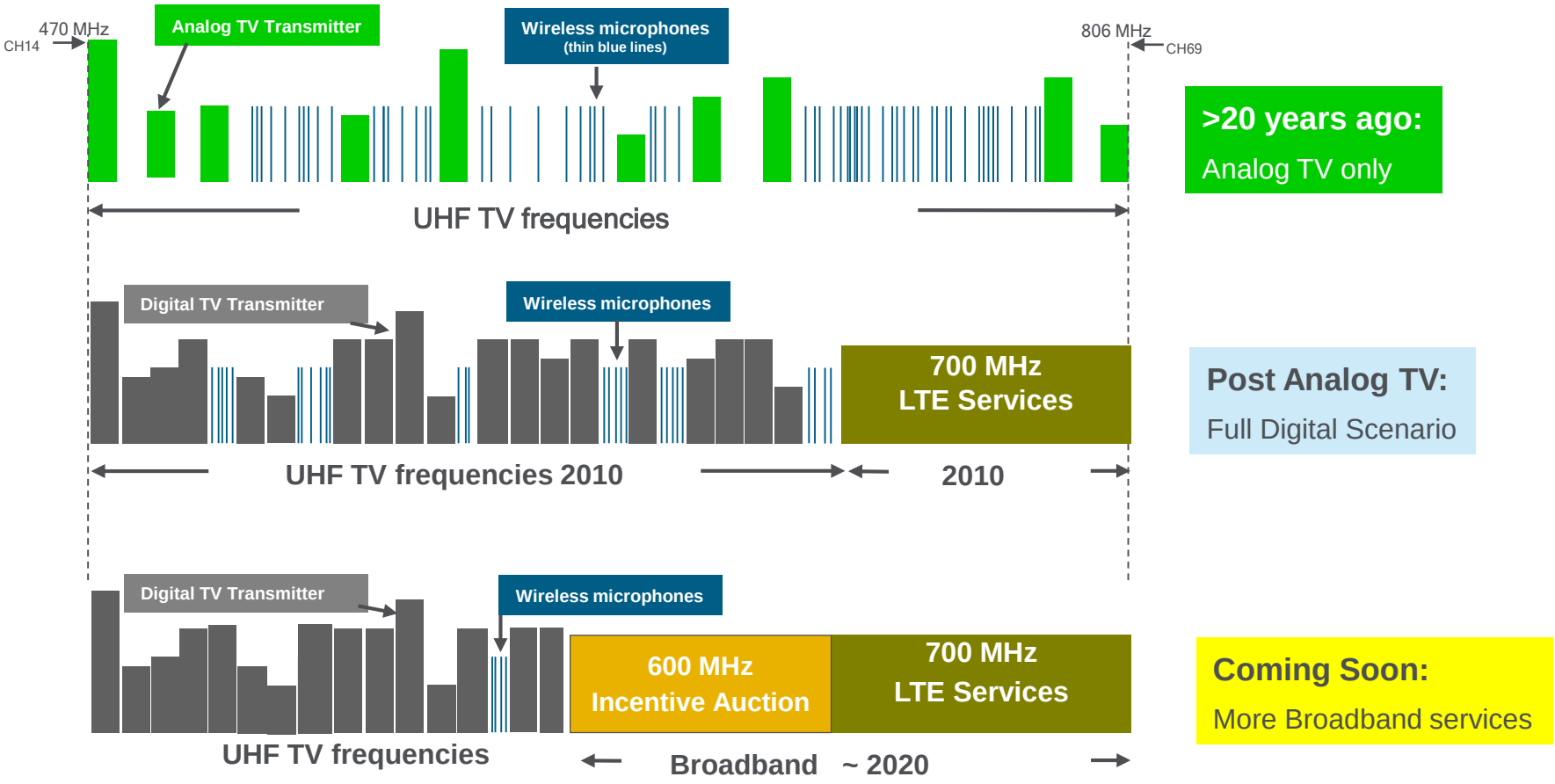
Future WRC Agenda Item: Harmonization of Frequency Bands for ENG (PMSE) Operations & other important issues for the content creation industry

Submitted by

Sennheiser Electronic Corporation
Shure Incorporated
CP Communications, LLC

May 20, 2019

Repurposing of UHF TV Band Spectrum Has Severely Impacted Wireless Microphones



TV White Space Channel Evolution

Economics: Content Creation vs. Distribution

- Spectrum is essential for content creation
- U.S. produced news and entertainment is the best in the world and vital to our economy:
  - Contributes $1.3 Trillion to the economy = 6.85% of the national GDP
  - 3-to-1 export-to-import ratio: the highest, by far, of any American made product or service
  - Demand for content and wireless microphones is robust
  - Productions continue to become more sophisticated

Essential Tools – Some Are Mission Critical

- Wireless microphones take many forms: handhelds, bodypack lapel mics, in-ear monitors, interruptible fold back (IFB) – cueing for on-air talent, intercom systems for backstage communications, coaching staff and crew in sporting events
- Networks and content creators routinely use 10 or more UHF channels for each of their daily productions
- Over 1600 coordinated frequencies (including lapel mics, intercoms, etc.) are used for Broadway theaters each night
- Major events often use hundreds
- Over 1500 frequencies are coordinated and used for the Super Bowl
- **Indispensable front end of the broadcast chain when reporting life critical information during major disasters**

The Commission Should Support Harmonization

- Repurposing of the 700 MHz and now 600 MHz bands have caused disruptions in the content creation industries
- U.S. operations now concentrated in 470-608 MHz
- The FCC opened alternate bands for wireless microphone use (GN Docket No. 14-166)
- It is in the United States' interest for other countries to permit the same bands as they make a similar transition
- The World Radio Conference (WRC) is the appropriate forum to promote harmonization

Alternative Bands

- **169 - 172 MHz**
  - (just below high band VHF TV channels) rules were revised to make it more practical for wireless mics. Licensed operation under FCC Part 90
- Additional frequency ranges above the TV Bands are now available to licensed wireless microphone operators:
  - **941.5 - 960 MHz**
    - Now open to all part 74 licensees (941.5 – 944 for fixed locations)
    - **CANADA:** 941.5-952/953-960 MHz now permitted=largely HARMONIZED w/ USA!
  - **1435 - 1525 MHz** – shared with flight training
    - Requires approval from AFTRCC (coordinating agency for this range).
- Several European Countries (undergoing 700 MHz transition):
  - 1518 – 1525 MHz  (potential partial harmonization)
  - 1350 – 1400 MHz
- United Kingdom (undergoing 700 MHz transition):
  - 960 – 1164 MHz (opened December 2018)

Harmonization Makes Sense!

ITU World Radio Conference (WRC)

- **A future agenda item is needed for WRC 2023**
  - Agenda items for future conferences will be determined at WRC 2019 this November

Request to FCC

- We are asking the Commission to endorse and promote an agenda item for WRC-23 to harmonize frequency bands for ENG
  - WAC document 85 (IB Docket 16-185)

Contact Information

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UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda ítem 10

10 *to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,*

Background Information:

Administrations are re-allocating spectrum away from Electronic News Gathering (ENG), also known as Services Ancillary to Broadcast and Program Making (SAP/SAB) and Programme Making & Special Events (PMSE), to accommodate wireless technologies, such as International Mobile Telecommunications (IMT). Some of this re-purposed spectrum is in the 600 MHz and 700 MHz bands which are heavily used by ENG. There is a general incompatibility in co-channel spectrum sharing between IMT and wireless ENG tools, particularly wireless microphones (where the definition of wireless microphones includes a wide variety of production tools such as intercom systems, in-ear monitors, and interruptible fold-back systems). For example, in the United States the repurposing of the 700 MHz band in 2010, and 600 MHz band currently in transition, not only has and will reduce TV broadcast spectrum, but will also displace a large portion of ENG operations. Other countries are now, or soon will be, undergoing a similar process. This re-purposing of spectrum from traditional TV broadcast to mobile broadband is an issue of the *distribution* of content. ENG fuels the *creation* of content and live event programs.

Demand for news and entertainment content has never been more robust, and is accelerating. Wireless microphones are used in the creation of virtually all content today, regardless of how that content is consumed: through TV, radio, laptop, tablet, cell phone, or in person. Furthermore, productions are increasingly more sophisticated, requiring more audio channels, many of them with high definition resolution. This long-term trend is clear and will inevitably continue. Worldwide, virtually all professional wireless microphones currently operate in the UHF TV band because this spectrum fulfills the requirements of demanding microphone applications, but will need alternative spectrum because of declining available of UHF TV spectrum in the 600 and 700 MHz bands, and increasing demand for content. Some administrations, including the United States, have recognized the importance and ubiquitous nature of wireless microphones and are attempting to accommodate the strong demand for news and content creation by permitting wireless microphones to also operate in alternative bands, outside TV spectrum, that are suitable for ENG applications, including 169-172 MHz and 941.5-960 MHz. As other administrations also transition from analogue TV to digital TV and mobile broadband, it is in the interests of administrations and industry to study and harmonize frequency bands and tuning ranges, as intended by Resolution ITU-R 59-1. Harmonization would provide economies of scale and logistical practicality, especially for networks and production companies

that must cover events in multiple countries, such as global news, elections, international sport events, conferences, and concert tours. ENG crews also provide early and essential disaster alert information to the public.

Proposal:

SUP USA/10(XXX)/1

RESOLUTION 810 (WRC-15)

Preliminary agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

Reasons: This Resolution must be suppressed, as WRC-19 will create a new Resolution that will include the agenda for WRC-23.

ADD USA/10(XXX)/2

DRAFT NEW RESOLUTION [USA-2023]

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;

b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;

c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves

to recommend to the Council that a world radiocommunication conference be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

1.[XXX] to consider, on the basis of ITU-R studies in accordance with Resolution **[USA/10/XX] (WRC-19)**, appropriate regulatory actions, ***Studies on additional frequency bands outside the 600 MHz and 700 MHz bands between 150 MHz to 2 000 MHz, and worldwide and/or regional harmonization for terrestrial electronic news gathering systems;***

1. ENG

resolves further

to activate the Conference Preparatory Meeting,

invites the Council

to finalize the agenda and arrange for the convening of WRC-23, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-23,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: Demand for ENG content is robust and accelerating. Currently, nearly all ENG audio tools (i.e., wireless microphones) operate in the UHF TV band, including the 600 MHz and 700 MHz bands that many administrations are re-allocating. As UHF spectrum is re-purposed from traditional analog TV to digital TV and mobile broadband, alternative suitable frequency bands are being made available for ENG applications. It is in the interests of administrations and industry to chart a smooth transition from the 600 MHz and 700 MHz to standardized alternate frequency bands that are suitable for ENG, i.e. between 150 to 2 000 MHz that are not already used by or set aside for incompatible services.

ADD USA/10(XXX)/3

DRAFT NEW RESOLUTION [USA/10/XX] (WRC-19)

RESOLUTION [xxx]

Studies on additional frequency bands outside the 600 MHz and 700 MHz bands between 150 to 2 000 MHz, and worldwide and/or regional harmonization for terrestrial electronic news gathering[1] systems

The World Radiocommunication Conference (Sharm El Sheikh, 2019),

[1] For the purpose of this Resolution, ENG represents all audio applications ancillary to broadcasting and programme making (SAB/SAP), such as electronic news gathering, electronic field production, TV outside broadcast, Program Making and Special Events (PMSE), wireless radio microphones and radio outside production and broadcast.

Considering

a) A large portion of ENG production tools, such as radio microphones, operate in vacant TV channels (6 MHz or 8 MHz wide) within the 600 MHz and 700 MHz bands;

b) that parts of these bands are being repurposed by many administrations from terrestrial TV to mobile broadband, resulting in loss of availability of many channels for ENG operations;

c) that the technical nature of most ENG tools results in a general incapability in co-channel spectrum sharing with mobile handsets and base stations;

d) that administrations will have to transition a large portion of ENG operations to alternate suitable spectrum, outside the 600 and 700 MHz bands;

e) that WRC-15 initiated studies concerned with spectrum usage and operational characteristics of portable and nomadic links for terrestrial ENG systems operation to spectrum already allocated for that purpose on a global basis, in accordance with Resolution 59-1;

e) that modularization and miniaturization of terrestrial ENG systems has increased the portability for these systems and has thus increased the trend towards cross-border operation of ENG equipment;

d) that the technical characteristics for television outside broadcast, ENG and electronic field production systems have been established in ITU-R Recommendations (e.g. ITU-R BT 1871),

noting

a) that studies undertaken by ITU-R indicate that national spectrum management could benefit from globally harmonized band planning for ENG systems;

b) that ENG-related studies in ITU-R are based on data for current and anticipated ENG spectrum requirements collected from many administrations in all regions;

c) that the lower frequency spectrum, i.e. less than 2 000 MHz tends to provide better propagation characteristics over obstructed paths, thereby increasing the reliability of ENG links operating in
these bands;

d) that the demand for ENG content is robust and accelerating,

recognizing

a) that the production of ENG content continues to become increasingly sophisticated, requiring more channels in higher audio and video resolution formats that require greater radio bandwidth;

b) that the dynamic nature of the use of ENG is driven in part by unscheduled and unpredictable events such as breaking news, emergencies and disasters;

c) that news gathering and electronic production typically takes place in an environment where several television broadcasters/organizations/networks attempt to cover the same event, creating a demand for multiple ENG links and increased demand for access to spectrum in suitable frequency bands;

d) that handheld and body pack transmitters as well as body worn receivers require compact size, battery operation, sufficient range and small, yet efficient antennas, favoring frequency usage for mobile audio ENG primarily within the frequency bands of 150 MHz to 2 000 MHz;

e) that there is a general incompatibility in co-channel spectrum sharing between wireless ENG / PMSE tools and some services that operate in portions of the 150 MHz to 2 000 MHz range. These include IMT; aviation radio services and aeronautical mobile telemetry (AMT)[2]; Radio Navigation Satellite Service (e.g., GPS); and other satellite downlink bands. Critical services that require protection and **should *not* be considered for global ENG harmonization** include aviation radio services and aeronautical mobile telemetry (AMT) in the **243 MHz, 328.6-333.5 MHz, 960-1215 MHz, and 1215-1400 MHz bands**; the radio navigation-satellite service (i.e., GPS, GLONASS, Galileo, and other GNSS systems) that operate worldwide at **1164-1215 MHz, 1215-1300 MHz, and 1559-1610 MHz** (along with any adjacent bands from which unwanted emissions could cause degradation) that are used by GPS, GLONASS, Galileo, and other GNSS systems; the mobile-satellite service bands at **149.9-150.05 MHz, 399.9-400.05 MHz, 406-406.1 MHz, 1518-1525 MHz, 1525-1559 MHz, 1610-1626.5 MHz, 1626.5-1660.5 MHz, 1668-1675 MHz, and 1980-2010 MHz**; the radio-astronomy and/or EESS (passive) bands at **608-614 MHz, 1400-1427 MHz, 1610-1613.8 MHz**; and meteorological service bands from **400.15 to 406 MHz**.

f) that some administrations have already identified such alternate, suitable spectrum between 150 MHz to 2 000 MHz for ENG (e.g. 941.5 - 960 MHz, 169 -172 MHz in the United States; 960 - 1 164 MHz in the United Kingdom; 1 350 – 1 400 MHz in portions of Region 1);

g) that ENG is conducted by professional organizations licensed to use spectrum. The following frequencies and bands are permitted for licensed operation of itinerant ENG throughout the United States and thus are candidates for regional and global harmonization:
169.575 MHz
170.025 MHz
171.075 MHz
171.875 MHz
174.000-216.000 MHz
450.000-451.000 MHz

[2] Notwithstanding the "general incompatibility" of wireless microphone co-channel sharing with AMT, the United States administration has allocated spectrum from 1435 - 1525 MHz for AMT with a secondary allocation for wireless microphones. This is subject to stringent coordination requirements.

455.000-456.000 MHz
470.000-488.000 MHz
494.000-608.000 MHz
653.000-657.000 MHz
944.000-952.000 MHz
952.850-956.250 MHz
956.450-959.850 MHz

h) that mobile ENG audio tools (i.e. wireless microphones) are low power devices, typically operating with transmitter output power of 50 mW – 250 mW, and have proven to pose a negligible risk of interference to services operating in adjacent channels (e.g. broadcast services);

i) that access to globally harmonized spectrum is highly desirable to facilitate the rapid and less restricted deployment and operation of ENG systems from one country to another,

resolves

1 that, based on studies undertaken by ITU-R, WRC-23 should address the feasibility of achieving a coordinated transition for ENG operations from the 600 MHz and 700 MHz bands to suitable alternate spectrum between 150 – 2 000 MHz, excluding frequency bands and frequency ranges provided in *recognizing e*, using the deliberations of administrations that have completed or begun their transition as a guideline. The transition should be planned in a manner that results in a satisfactory degree of worldwide/regional harmonization of spectrum for ENG use in terms of the frequency bands and tuning ranges[3];

2 that methods should be identified for the possible harmonization of frequency bands and tuning ranges for ENG usage,

invites ITU-R

1 to carry out studies of ENG regarding possible solutions for global/regional harmonization in frequency bands and tuning ranges, taking into account:
– propagation characteristics at various frequencies;
– available technologies to maximize efficient and flexible use of frequency;
– system characteristics and operational practices which facilitate the implementation of these solutions;

2 to include in the studies referred to above, sharing and compatibility issues with services already having allocations in frequency bands and tuning ranges which otherwise have potential for ENG use;

[3] The term “tuning range” for ENG means a range of frequencies over which radio equipment is envisaged to be capable of operating; within this tuning range, the use in any one country of radio equipment from another country will be limited to the range of frequencies identified nationally in that one country for ENG, and will be operated in accordance with the related national conditions and requirements.

3 to propose operational measures to facilitate operation of ENG equipment consistent with global circulation of radiocommunication equipment, taking into account Recommendation ITU-R M.1637;

4 to report the results of those studies to the World Radiocommunication Conference 2023 and identify ranges for regional and global harmonization,

invites administrations

to participate in the studies by submitting contributions to ITU-R.

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM TO IDENTIFY AND HARMONIZE FREQUENCY BANDS FOR ENG

Subject: Proposed Future WRC Agenda Item for WRC-2023 studying harmonization

Origin: United States of America

Proposal: To review the frequency bands permitted for ENG, identify alternate compatible bands outside of the 600 MHz and 700 MHz bands, and harmonize them among various administrations.

Background/reason:
Demand for ENG content is robust and accelerating. Currently, nearly all ENG audio tools (i.e., wireless microphones) operate in the UHF TV band, including the 600 MHz and 700 MHz bands that many administrations are re-allocating. As UHF spectrum is re-purposed from traditional analog TV to digital TV and mobile broadband, alternative suitable frequency bands are being made available for ENG applications. It is in the interests of administrations and industry to chart a smooth transition from the 600 MHz and 700 MHz to standardized alternate frequency bands suitable for ENG above 150 MHz and below 2 000 MHz that are not used by or set aside for incompatible services.

Radiocommunication services concerned: Terrestrial Broadcast, Mobile Service

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Resolution ITU-R 59-1, Report ITU-R BT 2069-7, Report ITU-R BT 2344-2, Recommendation ITU-R BT 1871-2

Studies to be carried out by: SG6	*with the participation of:* SG5

ITU-R Study Groups concerned: SG6, SG5

ITU resource implications, including financial implications (refer to CV126): **Minimal**

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No
Number of countries:

Remarks

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